REMARKS

Claims 1-21 are pending in the application. Claims 1, 2, 6, 11, 12 and 12 were rejected under 35 U.S.C. §103(a) as being unpatentable over Yamada et al. (USP 5,235,510) in view of Wood et al. (USP 5,715,823), and claims 3-5, 7-10, and 14-16 were rejected under 35 U.S.C. §103(a) as being unpatentable over Yamada in view of Wood and further in view of Bro (USP 5,596,994). Claim 2 has been canceled. Claims 1, 6 and 16 have been amended, and new claims 17-21 have been added, without new matter. Reconsideration of the application in view of the amendment and the following remarks is respectfully requested.

The present invention is a post-processing system for remotely accessing previously acquired and electronically stored patient information and data and for remotely generating volume data rendering results. Volume data have three or more dimensions. Volume data rendering is the process of converting an original volume data into synthesized data of different forms, i.e., with reduced (e.g. 2) dimensions and with derived data attributes. In the present invention, an operator at a remote receiving station such as a personal computer (PC) can access a transmitting station such as a server through a network such as the Internet. Through a user interface provided at the receiving station, an operator can specify a previously acquired patient volume data set stored in the transmitting station, and specify a request for volume data rendering by specifying the volume data rendering method and parameters to be applied to the volume data set. A processor in the transmitting station generates part or all of the volume data rendering result in real time, and a data transmitter in the transmitting station transmits the processed result back to the receiving station. The receiving station displays requested rendering result to the operator. Based on the feedback of the display, the operator may interactively issue new and adjusted requests until a desired result is achieved. This looping of actions, though involving multiple computers, occurs in real time so that the operator accesses data and computing power on the remote computer "on demand" (i.e. interactively) as if they were locally resided. Thus, there is no need for the entire patient volume data set to be transmitted to the receiving station. Also, the receiving station can be a very basic PC.

In the Office Action, claims 1, 2, 6 and 11-13 were rejected under 35 U.S.C. §103(a) as being unpatentable over Yamada in view of Wood.

Regarding claim 1, the Examiner correctly remarked that Yamada is silent about specifying volume data. In fact, Yamada discloses a *two-dimensional* data analysis system, where each two-dimensional data set, such as an X-ray or a CT scan, is analyzed to identify potential problematic areas. In contrast, the present invention is a *volume (three or more dimensional)* data post-processing and visualization system.

As a result, the resultant display of Yamada is the *original* two-dimensional data superimposed with markers highlighting potential problem areas. An operator can select from a menu of options to control the analysis of the two dimensional data using an appropriate diagnosis algorithm, and areas of concern and other information may be provided, but the data to be displayed (the CT scan, for example) remains unchanged. In contrast, the resultant display of the present invention is *synthesized data* with derived data attributes and/or data format, which are different from original data attribute and format.

In addition, Yamada discloses a system in which all data to be processed is first transmitted from a transmitting station to the user's receiving station. In contrast, the present invention teaches that the entire data set to be processed is maintained at the transmitting station side, and is not transmitted to the user's receiving station. Only the processed result is transmitted to the user's receiving station.

The Examiner further remarked that "Wood discloses an ultrasonic diagnostic imaging system comprising an user interface means provided at receiving station for enabling the user to specify at least one request of volume data rendering result," and referenced column 11, lines 25-45 and FIG. 10 of Wood. However, there are several important differences between Wood and the present invention. First, Wood discloses a two or three dimensional ultrasound *data acquisition* and distribution system, whereas the present invention is a *data post-processing* and distribution system for volume data rendering (converting existing volume data to synthesized data of a different form). In other words, Wood discloses a data gathering system controlled remotely in which the gathered data is transmitted to the remote location, while the present invention is a post-storage data processing system controlled remotely in which the post-processed data is transmitted to the remote location.

In fact, as indicated by the direction of the arrow connecting image processor 16 and image store 24 in FIG. 1 of Wood, an image processor is used to process data being acquired by

a scanhead 12 (an ultrasound probe). The processed data is then stored in image store 24. As further indicated in column 3 lines 20-25 and FIG. 1 of Wood, a remote user of Wood can access data stored on storage medium 24, but cannot access and control the computing resource (image processor 16) on the transmission side, and cannot read a previously stored data set back from the data storage to image processor 16 and perform post-(storage) processing. In other words, once the data is stored on the storage medium, no further processing can be performed. In contrast, the present invention enables its users to remotely 1) access and control the computing resource (the image processor, which is also called the volume data rendering generator in our application) on the transmission side, 2) read previously stored data sets back from data storage (also called the image data source in our application) to the image processor at the transmission side, and 3) perform post-(storage) processing.

Second, regarding the text and figure referenced by the Examiner (column 11, lines 25-45 and FIG. 10 of Wood), Wood describes softkeys located below an ultrasound image "to command the *ultrasound system controller 18 to change the operation of the ultrasound system* in accordance with the function of the selected control." Wood further states in column 11, lines 50-54 that "these capabilities mean that a physician can perform an ultrasound *exam* from distances of thousand of miles from the patient, *needing only a pair of hands at the patient's location to hold and manipulate the ultrasound probe*." The above descriptions further confirm that Wood system is *data acquisition* system, not a *post-processing* system. In other words, an operator at the receiving end can communicate instructions back to the transmitting end to alter the mode or manner in which the data is being acquired and received (e.g., changing the position of the scanhead with regard to a patient), but otherwise has no control over how the data should be processed.

As a result, when an user of Wood system switches modes (e.g., from 2D to 3D) and parameters, the user issues a *data acquisition command* that switches the data *acquisition modes* and data acquisition *system parameters* that will take in effect in capturing the *follow-on* ultrasound images. In contrast, in the present invention, the *volume data rendering method and parameters* specified by the user (for example, rotating the data model generated by the volume rendering method by 30 degrees) are *post-processing commands* operable on *previously* captured volume data.

Furthermore, the invention of Wood, as a *data acquisition* system, *requires the presence of a patient and an ultrasound system operator* (holding the ultrasound probe) at the transmission side when the remote user issues data acquisition modes and data acquisition system parameters. In contrast, the present invention, as a *post-processing* system, *does not require the presence of the patient and the system operator at the transmission side* when the remote user issues requests to the server, specifying the volume data rendering method and parameters.

Thus, neither Yamada nor Wood discloses, teaches, or suggests performing post-acquisition volume data rendering using computing resources on the remote (transmitting) station, as required by claim 1. Yamada only teaches the post-acquisition analysis of two-dimensional data in the receiving station. The data is not synthesized into a different form. Wood only discloses a data acquisition system, not a post-acquisition data processing system.

Furthermore, neither Yamada nor Wood discloses, teaches, or suggests that the entire data set to be processed should be kept at the transmitting station side rather than transmitted to the user's receiving station and that only the processed result is transmitted to the user's receiving station.

In addition to the differences discussed above, we would like to point out one more important difference between Yamada and Wood and the present invention. Both Yamada and Wood deal with *one-step process* requests that are *non-interactive*. In other words, whether a CAD request is made in Yamada, or an image is received or a switching operation mode request is made in Wood, the desired result is obtained in one step by one request. In contrast, the present invention can accommodate *highly interactive* requests. Obtaining a desired volume rendering and visualization result (for example, with the optimal viewing orientation and zooming factor) is a trial-and-error *multi-step navigation process*. Based on the feedback of each step (request), the user may interactively issue new requests by specifying an adjusted volume data rendering method and adjusted rendering parameters through the user interface until a desired result is achieved. Neither Yamada nor Wood discloses, teaches, or suggests such a highly interactive system.

In summary, neither Yamada nor Wood discloses, teaches or suggests (1) post-acquisition volume data rendering of previously captured volume data, (2) performing post-acquisition volume data rendering using the computer resource of remote computer(s), (3)

transmitting only the volume data rendering result to the receiving station while keeping the entire original data set at the transmitting station, and (4) performing the above three tasks interactively.

Moreover, no motivation would have existed to combine Yamada and Wood, because Wood is only concerned with the capturing of data, while Yamada is only concerned with the analysis of previously captured data. The tools disclosed in Yamada and Wood are directed to completely different phases of a medical examination. Even if sufficient motivation existed for one skilled in the art to combine Yamada and Wood, the invention of claim 1 would not be obvious from the combination because none of the four limitations mentioned above are disclosed, taught, or suggested in Wood or Yamada. Because of the foregoing, the Applicant respectfully submits that the rejection of claim 1 under 35 U.S.C. §103(a) as being unpatentable over Yamada in view of Wood has been overcome.

Regarding claims 6 and 11-13, all of these claims depend from claim 1. Because the rejection of claim 1 under 35 U.S.C. §103(a) as being unpatentable over Yamada in view of Wood has been overcome, the Applicant submits that the rejections of claims 6 and 11-13 have also been overcome for the same reasons given with regard to claim 1.

Claims 3-5, 7-10, and 14-16 were also rejected under 35 U.S.C. §103(a) as being unpatentable over Yamada in view of Wood and further in view of Bro. All of these claims depend from claim 1. Because the rejection of claim 1 under 35 U.S.C. §103(a) as being unpatentable over Yamada in view of Wood and further in view of Bro has been overcome, the Applicant respectfully submits that the rejections of claims 3-5, 7-10, and 14-16 have also been overcome for the same reasons given with regard to claim 1.

In view of the amendments and foregoing remarks, it is respectfully submitted that the present application is in condition for allowance. Reexamination and reconsideration of the application and allowance of the claims at an early date is respectfully requested.

If, for any reason, the Examiner finds the application other than in condition for allowance, the Applicant requests that the Examiner contact the undersigned attorney at the Los Angeles telephone number (213) 892-5752 to discuss any steps necessary to place the application in condition for allowance.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**VERSION WITH MARKINGS TO SHOW CHANGES MADE**".

In the unlikely event that the transmittal letter is separated from this document and the Patent Office determines that an extension and/or other relief is required, Applicant petitions for any required relief including extensions of time and authorizes the Assistant Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing docket no. 495392000300.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

1. (Amended) A post-processing system for remotely accessing patient information and data previously acquired and electronically stored, [electronically]and for remotely generating a volume data rendering result, comprising:

at least one receiving station [under the control of]controllable by at least one user of said system;

at least one transmitting station physically separated from said receiving station for communicatively coupling to said receiving station through at least one network;

[at least one type of network connecting, and transmitting data between, said transmitting station and said receiving station;]

user interface means provided at said receiving station for [said system accessing at least one patient data source containing]enabling a user to specify at least one patient volume data set previously acquired [using at least one data acquisition method]and stored in said transmitting station[;], and

[user interface means provided at said receiving station for enabling said user] to specify at least one request [of]for volume data rendering[result, said request] comprising [specification of data rendering parameters of at least one]specifying a volume data rendering method and rendering parameters to be applied on [at least one radiological]said volume data set[from said data source];

an image processor at said transmitting station interactively controllable at said receiving station to generate a partial or complete volume data rendering result in real time by processing said volume data set using said volume data rendering method and rendering parameters specified by said user;

a data transmitter provided at said transmitting station for transmitting said processed result to said receiving station; and

display means for displaying the requested rendering result and rendering parameters at said receiving station.

6. (Amended) The system of claim 1 wherein:

[said transmitting station includes means for computing at least a part of said rendering result, and]said receiving station includes means for computing the remaining part of said rendering result.

16. (Amended) The system of claim [2]1 wherein:

said user interface means comprises means for enabling said user

to specify different data rendering requests resulting from different rendering parameters, different rendering methods, and/or different data sets from one or multiple data acquisition methods, and

to specify a method to integrate said different data rendering results into at least one composite rendering result; and

said display means for presenting at said receiving station said composite rendering result and a plurality of parameters used for generating said composite rendering result.